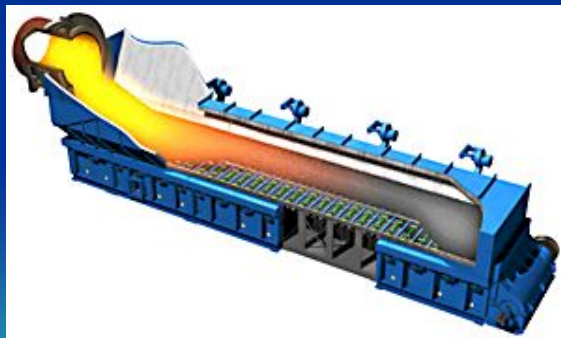


Empower the Energy Team: Engaging Process People in the Program

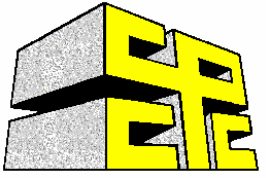
Steve Coppinger
Chief Electrical Engineer
California Portland Cement Company
scoppinger @ calportland.com

Presented at the ENERGY STAR 2005 Leadership Conference
Arlington, Virginia



October 26, 2005



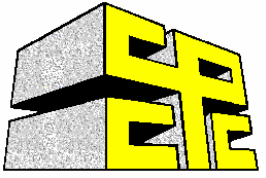


Process Energy Management



OVERVIEW

- Company Background
- Cement Process
- Energy Program
- Process Energy Team
- Initiatives
- Benefits
- Challenges
- Results

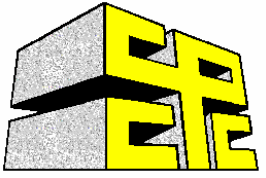


Process Energy Management



Company Background

- Founded in 1891
- Producer of Cement, Concrete and Aggregates
- Recent merger with sister company – Glacier NW
- Facilities on West Coast from Alaska to California including Nevada
- 2000 Employees
- ~\$1 Billion Annual Sales



Process Energy Management



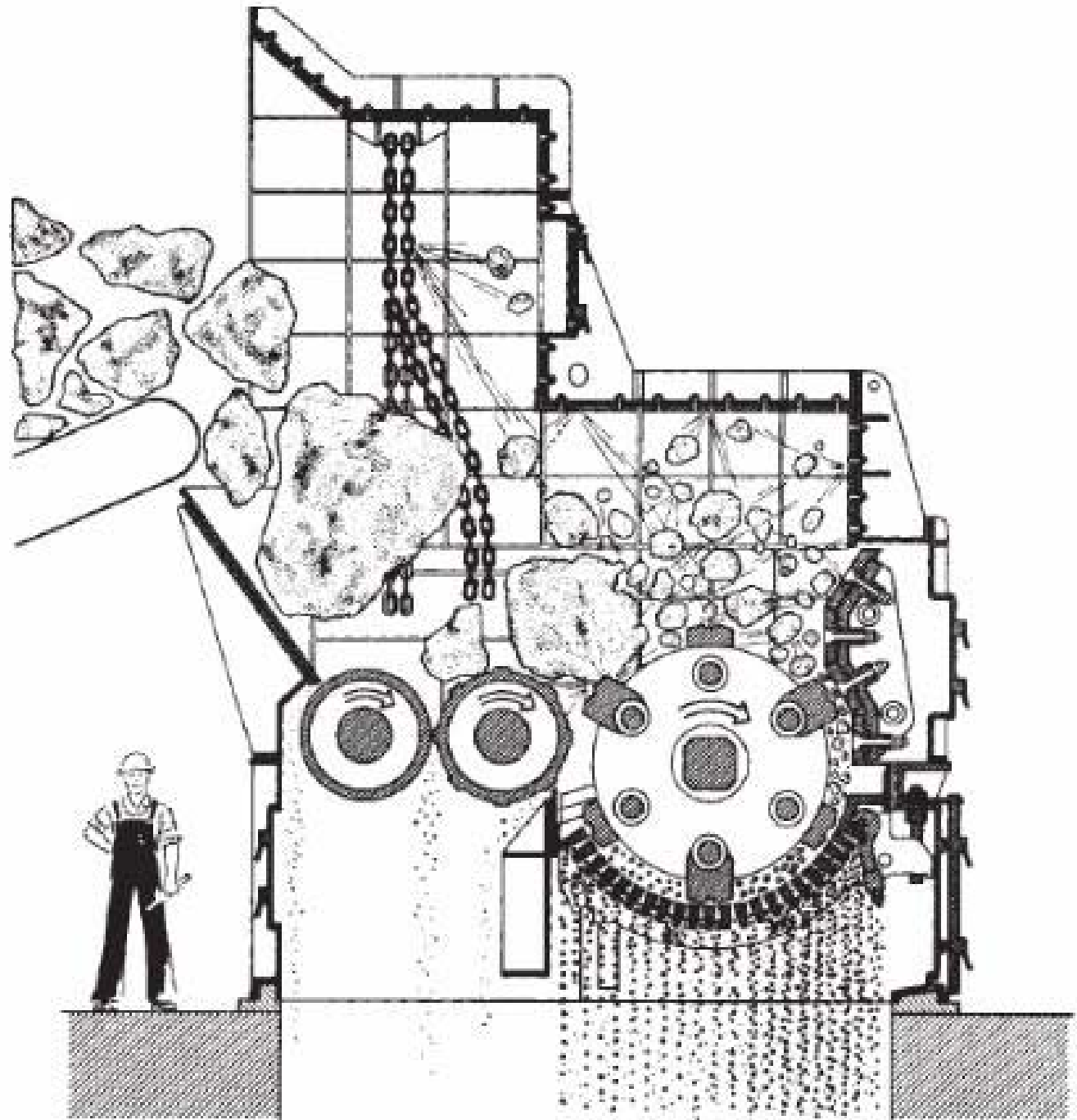
Cement Process

- Energy intensive process – Conversion of car-sized rock to fine talcum powder
- “Passing a mountain through the eye of a needle twice”
- Mining, crushing, blending, grinding, heating (3000 deg. F), cooling, conveying, grinding & shipping
- Energy as much as 30% of cost – 50% variable costs
- Typical power demand 22-27 MWatts
- Coal is primary fuel





Crusher



Vertical Mill



Preheater-Precalciner Tower & Kiln

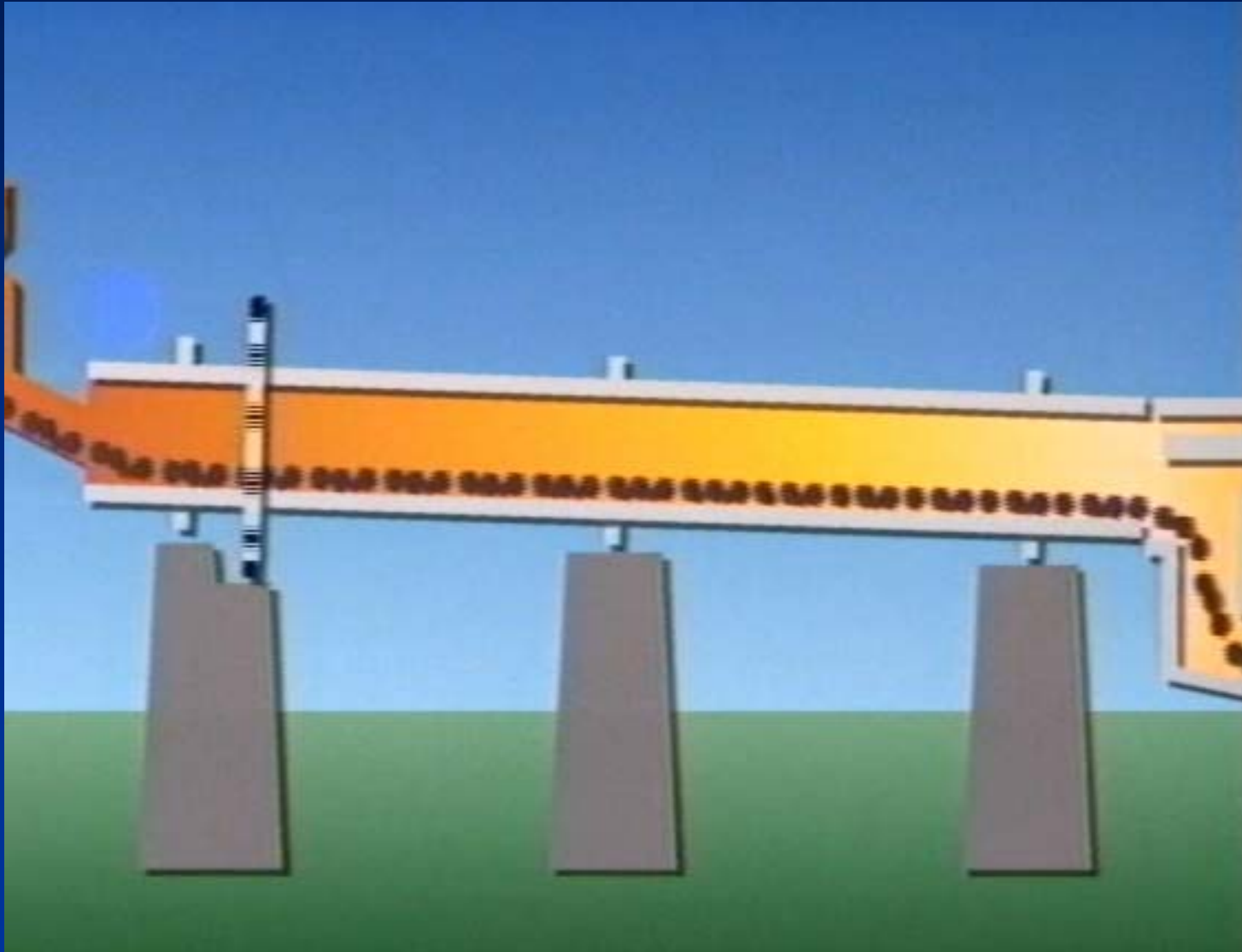


Preheater-Precalciner Tower

- Air flows up
- Feed flows down & into Kiln

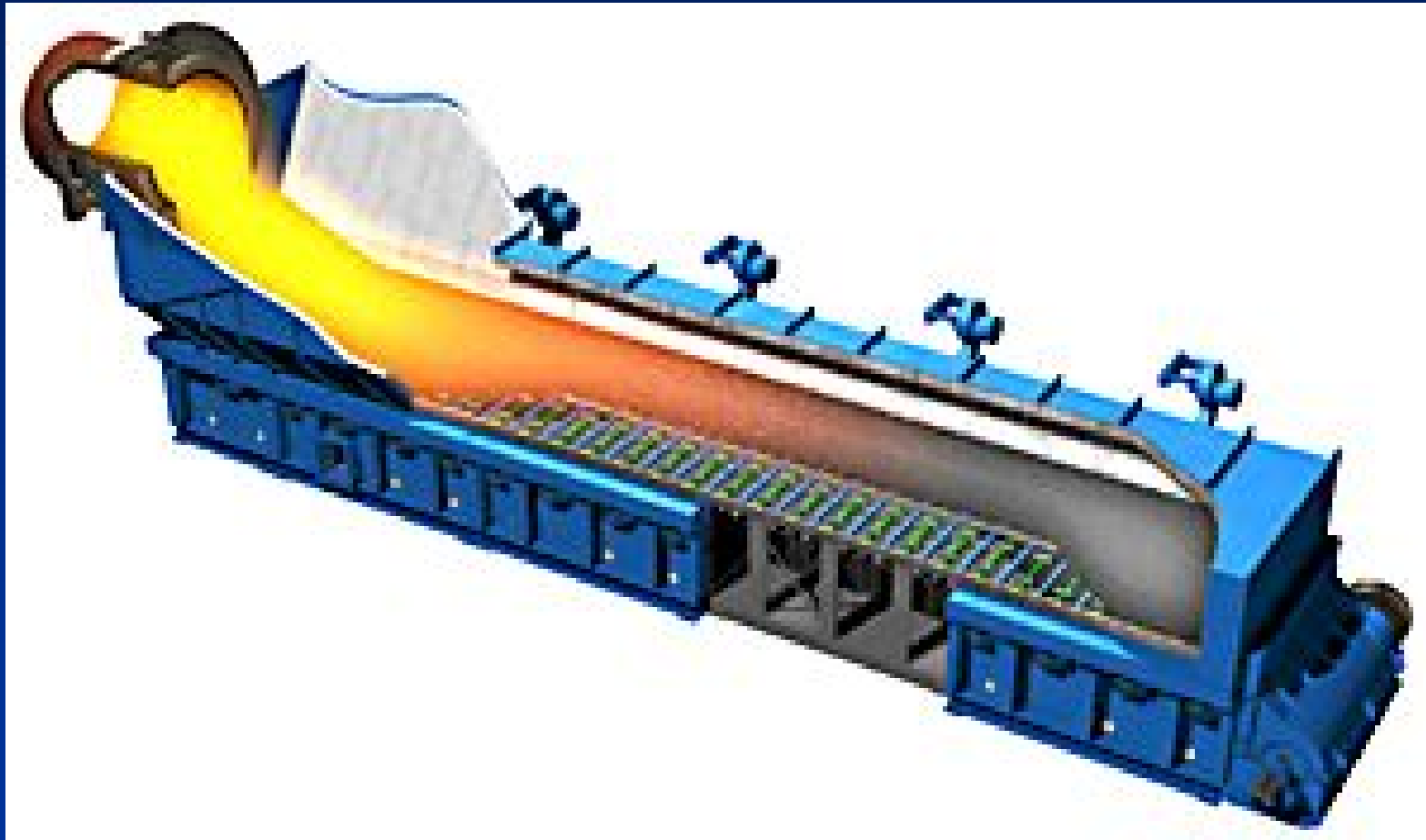


Material flows through rotary Kiln
Temperatures may reach 3000 deg. F

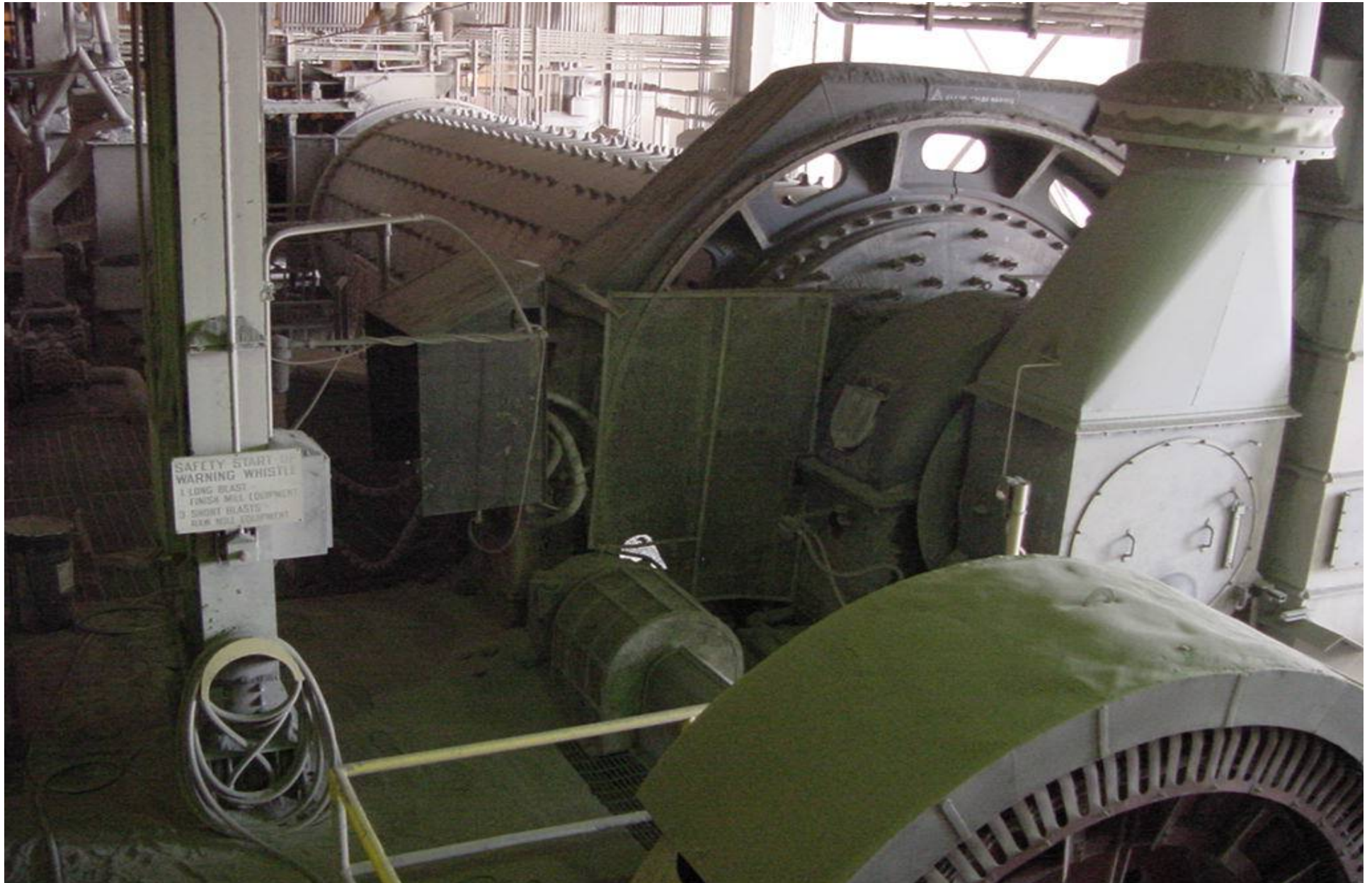


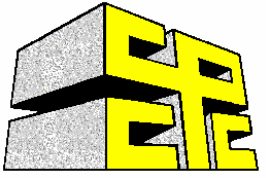


Clinker is formed in the Kiln and cooled in the Clinker Cooler



Finish Mill



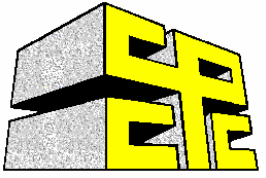


Process Energy Management



Energy Program

- Formal program created in 2003
- Corporate Energy Team
 - Meets every 6 weeks at various plant sites
- Local Energy Teams
 - Meet with plant departments
- Process Energy Team
 - Performs process audits
- Management & Plant Support



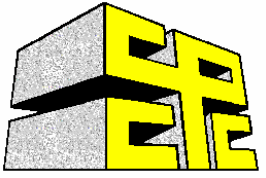
Process Energy Management



Process Energy Team

- Reviewed Energy Star LBNL Cement Guide – mostly large capital projects identified
- Created team of Process Engineers from each cement plant & corporate
- Goals: Reduce energy costs & emissions i.e. maximize performance of existing equipment
- Met with plant managers & process engineers to develop project list – “Best Bang for the Buck”
- Developed audit schedule
- First finish mill study in January 2005





Process Energy Management

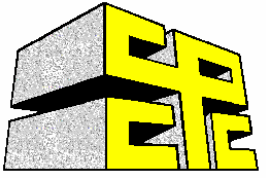


Initiatives

- Audits/detailed system studies
- Benchmarking – ENERGY STAR EPI
- Gather process & energy data & review with plants and energy team – explain excursions & trends
- Optimize equipment run times
- Perform/manage Plant-wide Assessments - DOE
- Review new technology – implement pilot programs e.g. vibration sensor on mills
- Apply for rebates







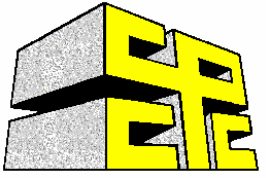
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Audits

- Take measurements – air flow, temperature, pressure, heat balance
- Review process and operational data
- Establish baseline operations
- Validate field instruments and scales
- Evaluate tuning & controls
- Improve process efficiencies – grinding, fuel
- Reduce process heat losses





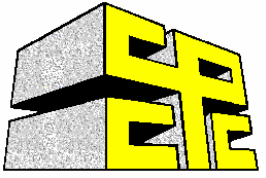
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Audits (cont'd)

- Optimize chemistry
- Improve quality control
- Develop reports with recommendations
- Perform follow-up audits





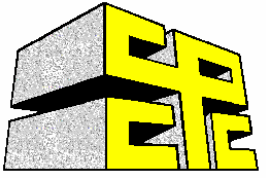
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Example Audit:

Colton D4 finish mill system study in January 2005

- Identified several process opportunities
 - Mill sweep and high mill temperatures
 - Separator adjustments/tuning
 - Plugged screens inside mill
 - Ball charge gradation
 - Scale calibration
- \$200,000 per year annual power savings identified
- Low capital cost to implement
- Improvements in progress

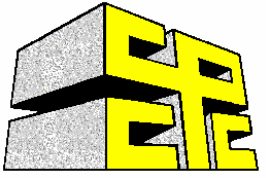


Process Energy Management



Benefits:

- Tangible
 - Reduce energy consumption & emissions
 - Improve production efficiency
 - Improve process engineering skills
- Not so “concrete”
 - Sharing information/ideas between plants
 - Seeing other plants often inspires new ideas
 - Learning from peers
 - Common solutions to common problems
 - Friendship/camaraderie leads to better communication



Process Energy Management

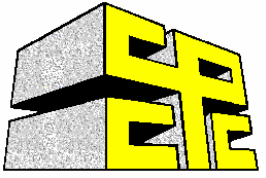


Challenges:

- Production pressures
- “Not enough time”
 - Routine duties
 - Special assignments
 - Shifting priorities
- Resistance from plant personnel – “We’ve already looked at that”
- Pride of “ownership”
- Defining the role of the plant Process Engineer

Management commitment and support alleviates these challenges



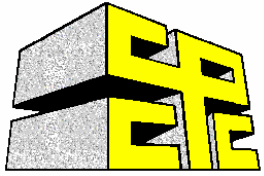


Process Energy Management



Results:

- 4 process audits performed to date
- ~\$500 K/yr. of opportunities identified
- Several process improvement projects underway
- CPC has been approved for > \$1.3 million in rebates for process improvement projects
- Process energy data review is formalized
- Energy costs mandate continuous process evaluation & improvement



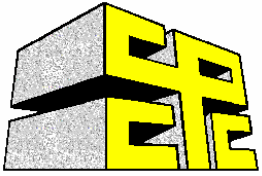
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PARTNER OF THE YEAR 2005



I can save **how much** money by conserving energy???



Process Energy Management



QUESTIONS?